

WHAT IS CLAIMED IS:

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1. A method for converting a color value of a color in a perceptual color space, comprising the steps of:  
applying multiple inverse transforms to the color value, each transform for transforming the color value from a perceptual color space to a viewing condition dependent color space, each different inverse transform corresponding to a different viewing condition, thereby resulting in plural different target color values for the color in respective ones of multiple different viewing conditions in a viewing condition dependent space; and  
calculating a single color value in device dependent color space that fits the plural target color values with acceptable error.

2. A method according to Claim 1, wherein the step of calculating a color value in device dependent color space comprises the step of applying regression analysis to the plural different target color values using a spectral model that measures spectral reflectance of colors in the device dependent color space.

3. A method according to Claim 2, wherein the regression analysis is comprised of a least squared fit.

4. A method according to Claim 2, wherein the regression analysis is a weighted regression analysis in which the multiple different viewing conditions are weighted.

5. A method according to Claim 4, further comprising the step of entering weight values into a user interface.

6. A method according to Claim 2, wherein the spectral model also models fluorescence.

7. A method according to Claim 1, wherein the multiple different viewing conditions comprise different viewing illuminants.

8. A method according to Claim 1, wherein the multiple different viewing conditions include multiple different surrounds.

9. A method according to Claim 1, further comprising gamut-mapping in the perceptual color space.

10. A method according to Claim 1, further comprising the step of storing the device dependent values in a look-up table accessible as a function of the color values in perceptual color space.

11. A method according to Claim 9, further comprising the step of estimating likely XYZ values for a given color patch based on probabilistic estimates of the most likely viewing conditions, measurements of the spectral reflectance of colorants on a given medium and the response functions of the CIE Standard Observer so as to perform gamut mapping.

12. A method according to Claim 10, estimating likely XYZ values for a given color patch based on probabilistic estimates of the most likely viewing conditions, measurements of the spectral reflectance of colorants on a given medium and the response functions of the CIE Standard Observer so as to create an input lookup table from input device values to tristimulus values or perceptual color space coordinates.

13. An apparatus for converting color coordinates of a color in a perceptual color space, comprising:

a program memory for storing process steps executable to perform a method according to any of Claims 1 to 12; and

a processor for executing the process steps stored in said program memory.

14. Computer-executable process steps stored on a computer readable medium, said computer-executable process steps for converting color coordinates of a color in a perceptual color space, said computer-executable process steps comprising process steps executable to perform a method according to any of Claims 1 to 12.

15. A computer-readable medium which stores computer-executable process steps, the computer-executable process steps for converting color coordinates of a color in a perceptual color space, said computer-executable process steps comprising process steps executable to perform a method according to any of Claims 1 to 12.

16. A user interface for implementing a metamerism-reducing color transformation from a perceptual color space to a device dependent space, wherein the transformation includes the steps of applying multiple different transforms to a color value in the perceptual color space, one each for respective ones of different viewing conditions, thereby resulting in plural different target color values in a viewing condition dependent space, and applying a weighted regression analysis to the plural different target color values in viewing condition dependent space so as to result in a color value in device dependent coordinates that fits the plural different target color values in viewing condition dependent space with acceptable error, said user interface comprising:

a user manipulable region on the user interface for entering weights for the weighted regression analysis; and

a user manipulable region on the user interface for selecting the multiple different viewing conditions.

17. A user interface according to Claim 16, wherein the multiple different viewing conditions include different viewing illuminants.

18. A user interface according to Claim 16, wherein the multiple different viewing conditions include different viewing surrounds.

19. A color management system for converting from a source image in source device dependent coordinates to a destination image in destination device dependent coordinates comprising:

a first transformation sequence for transforming the source image in source device dependent coordinates into a perceptual color space; and

a second transformation sequence for transforming from the perceptual color space into the destination device dependent coordinates;

wherein the second transformation sequence includes a transformation from the perceptual color space into a viewing condition dependent space with plural such conversions being applied using respective ones of multiple different viewing conditions, and regression analysis on the plural results so as to obtain a color in device coordinates that best fits the plural results.

20. A color management system according to Claim 19, wherein the regression analysis is comprised of a least squared fit.

21. A color management system according to Claim 19, wherein the multiple different viewing conditions comprise different viewing illuminants.

22. A color management system according to Claim 19, wherein the multiple different viewing conditions include different surrounds.

23. A color management system according to Claim 19, wherein the regression analysis is a weighted regression analysis in which the multiple different viewing conditions are weighted.

24. A color management system according to Claim 23, further comprising a user interface into which a user can enter weight values.

25. A color management system according to Claim 23, wherein a spectral model also models fluorescence.

26. A color management system according to Claim 19, further a storage device for storing the device dependent coordinates in a look-up table accessible as a function of the color values in perceptual color space.

27. A color management system which utilizes device profiles to transform a source image in a source device dependent color space to a destination image in destination device dependent color space,

wherein at least one device profile includes instructions for transforming from a perceptual color space to a device dependent color space, such instructions implementing an application of multiple different inverse transforms to a color value in the perceptual color space, one each for respective ones of different viewing conditions, thereby resulting in plural different target color values in a viewing condition dependent space, and a calculation of a color value in the destination device dependent space that fits the plural different target color values with acceptable error.

28. A color management system according to Claim 27, wherein the instructions in the device profile are stored as a look-up table that maps colors in the perceptual color space to the destination device dependent color space.

29. A color management system according to Claim 27, comprising plural device profiles, each tailored to specific expectations of probable viewing conditions, and further comprising a user interface for selecting one of the plural device profiles for use in the transformation from source image to destination image.